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AUTOMATED NUMBER PLATE RECOGNITION SYSTEM

ABSTRACT

In this paper, we propose an automatic and mechanized license and number plate recognition (LNPR) system which can extract the license plate number of the vehicles passing through a given location using image processing algorithms. No additional devices such as GPS or radio frequency identification (RFID) need to be installed for implementing the proposed system. Using special cameras, the system takes pictures from each passing vehicle and forwards the image to the computer for being processed by the LPR software. Plate recognition software uses different algorithms such as localization, orientation, normalization, segmentation and finally optical character recognition (OCR). The resulting data is applied to compare with the records on a database, if the vehicle exist in the record green light must be turn on otherwise red light must be turn on. Experimental results reveal that the presented system successfully detects and recognizes the vehicle number plate on real images. This system can also be used for security and traffic control.

INTRODUCTION

Vehicle's license and number plate recognition (LNPR) system has been an important area of research interest in image monitoring and processing systems. With the advent of high-tech cameras, number plate recognition system has numerous applications for traffic management applications, and especially in the parking lot. LNPR system has many applications such as border crossing control, identification of stolen vehicles, automated parking attendant, red light camera, petrol station surveillance, speed enforcement, security. For many of these applications, most of the basic processing algorithms remain the same.

The LNPR system works in four steps, the first step is the detection and capturing a vehicle image, the second one is the detection and extraction of number plate in an image. The third step uses image segmentation technique to get the individual character and optical character recognition (OCR) to recognize the individual character with the help of database stored for each and every alphanumeric

character. The fourth step is that after checking the database record for the particular vehicle, turn on red or green light.

In LNPR system, the main detection hardware of the first step including some cameras will be installed in places of interest for intersection control to identify vehicles which can or can't be allow for entrance. The technique used in some papers is based on pattern matching, which is fast and accurate enough for real-time applications and is developed for recognition of license plates with prior knowledge of letters and numbers orientation. Since the orientation and font used for number plates differ in different countries/states/provinces, this algorithm is needed to be modified accordingly keeping its structure intact, if we want to apply this system for recognizing the number plates of those places.

The rest of the paper is organized as follows: section II will present the system model of the developed LNPR system. Section III will present the LNPR software with detailed information on used algorithms. Section IV presents LNPR system advantages briefly and finally section V will end the paper with the conclusion.

SYSTEM MODEL

LNPR system is proposed for monitoring and managing traffic in the parking lots of private and public organizations via identifying vehicle license plate numbers at the parking gate. No additional equipment need to be installed on vehicles for operating this system. Fig. 1 shows that the only requirement of this system is installing special cameras for identifying license numbers at the entrance gate of the parking lots. The images taken by the camera are subsequently processed in a computer. All vehicle licensed numbers are stored in the system database for a long time. Thus, the licensed number can be retrieved from parking gate at different times and green light must be turn on for authorized vehicle otherwise red light must be turn on.

The cameras used in the system can be deployed under all weather conditions and are equipped with powerful infrared radiation units for identifying vehicle license plates in absolute darkness. The lenses used in the camera provide high-quality image processing capabilities.

Implementing the proposed system can provide a higher level of security and safety in the controlled area for the vehicles. The system can be connected to gate with green and red light to provide automatic and intelligent turn on green light for authorized vehicles.

TECHNICAL FEASIBILITY

In this section, we introduce LNPR software. A picture was taken by a camera shown in Fig. 2(a) is sent to LNPR software for image processing and number recognition.

To maximize the flexibility of the LNPR system, a modular structure is chosen. In every module image processing algorithm(s) will be implemented. The software uses nine algorithms means nine modules for identifying a license and number plate follows:

Plate Localization: This algorithm is responsible for finding and isolating the plate on the picture.

Plate orientation and sizing: this algorithm compensates for the skew of the plate and adjusts the dimensions to the required size.

Conversion: Using some conversion image processing techniques, the image can be converted as desired for instance to have a simpler processing of the image, we convert the image from red-green-blue (RGB) layers to gray scale layer.

Normalization: this algorithm adjusts the contrast and brightness of the image

Edge detection: it is applied to increase the picture difference between the letters and the plate backing. A median filter may also be used to reduce the visual noise on the image.

Character segmentation: this algorithm finds the individual characters on the plate and segments them for extra enhancement and also additional lines are deleted

Optical character recognition: it is the electronic conversion of images or printed text into machine encoded text

Syntactical and geometrical analysis: it checks characters and positions against country-specific rules.

ECONOMICAL FEASIBILITY

TIME FEASIBILITY

The estimated time for this project is about 1 year. As a project can be done within given period of time completely without any wastage of time.

LEGAL FEASIBILITY

According to this project there is no such copyright issue or any ethical problem. This project is clearly legal at all.

GOALS

The purpose of this paper is to develop and implement a smart system for optimum use of information and communication technology (ICT) for managing executive organizations as well as forming a database for facilitating decision-making and adopting better staff and strategic planning methods. License plate number is one of the most appropriate information items for identifying a vehicle.

CONCLUSION

In summary, this paper presented the automatic vehicle identification system using vehicle license and number plate recognition. The LNPR software of the system uses series of image processing algorithms for number plate recognition and finally identifying the vehicle from the database stored on the PC. This software has been written in .Net C# based on the studied and simulated algorithms in Matlab. The SQL database has been used to store different achieved records of vehicles. We have evaluated the system performance on real images. Both the simulation and practical results revealed that the LNPR system can robustly detect and recognize the vehicle using license plate in different lightening and weather conditions and can be implemented on the entrance of highly restricted areas.

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